that mannite could be isolated from practically every sample of normal corn silage. The alcoholic extract from dried silage yielded, on evaporation, considerable amounts of mannite, which after one recrystallization gave the characteristic crystals melting at 168–169°. That the presence of mannite can not be considered a local phenomenon is shown by the fact that silage samples obtained from a number of other states in the middle west all contained mannite. The only previous reference to the occurrence of mannite in silage is in a paper by Manns,[1] published a quarter of a century ago. In his work, however, only one sample of silage was examined and the approximate amount of mannite found was not stated.

The following table shows the amount of mannite actually isolated by us from samples of silage obtained from various sources:

Date	Source	Material	Mannite. (Per Cent. on Air-dry Basis)
Feb. 20	Iowa	Corn silage juice	1.30
Mar. 14	Wisconsin	Corn silage	1.70
Mar. 20	Nebraska	Corn silage	2.07
Mar. 21	Minnesota	Corn silage	2.51
Mar. 27	Minnesota	Corn silage	1.47
Mar. 27	Illinois	Corn silage	2.15
Mar. 23	Missouri	Silage from immature corn	0.52
Mar. 20	Kansas	Cane silage	3.30
May 17	Montana	Sunflower silage	5.61
Apr. 16	Arkansas	Corn and cowpea silage	none
Mar. 2	Illinois	Sweet clover silage	none
May 11	Iowa	Ensiled corn stover + sucrose 30 days	3.04
Feb. 21	Iowa	Ensiled corn stover + sucrose 13 days	2.12
May 27	Iowa	Ensiled green corn 10 days	1.72
Feb. 21	Iowa	Ensiled corn stover + glucose 30 days	none

It will be noted that the highest percentages of mannite are to be found in the sunflower silage, the cane silage and the experimental corn silage to which sucrose had been added. Evidently the mother substance of the mannite is sucrose, or more specifically its fructose moiety.

The production of mannite no doubt reaches a maximum soon after filling the silo and then some loss probably occurs, owing to further bacterial activities. However, the amount of mannite is still considerable when the silage is several months old.

If it is desired to prepare quantities of mannite without reference to an approximately quantitative yield, the method may be much simplified. The silage is put in a powerful press, the juice filtered, evaporated to about one sixth of its volume and two or three volumes of alcohol added. The mannite then crystallizes out, and the alcohol can be recovered in the usual way. In this manner it should be possible to extract the mannite on a large scale at very little cost. The pressed residue and the mother liquor could be combined and used for feeding in place of the original silage, since practically nothing would be removed but the mannite and the volatile acids.

Mannite yields a nitration product very similar in properties to nitroglycerin. According to Sanford,[2] "Nitromannite is more dangerous than nitroglycerin, as it is more sensitive to shock. It is intermediate in its shattering properties between nitroglycerin and fulminate of mercury. . . . It is not manufactured upon the commercial scale."

The reason nitromannite is not made commercially is probably the prohibitive cost of mannite. Prepared by the above method from silage, mannite should be even cheaper than glycerin, especially if the residues are utilized as cattle feed. The thousands of tons of silage used every year by the farmers of this country could be made to yield a valuable by-product if treated by this simple process.

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[1] Illinois Ag. Exp. Sta. Bulletin, No. 7, pp. 190–193.

[2] Nitro-Explosives, p. 110, D. Van Nostrand Co., 1906.

THE NORTH CAROLINA ACADEMY OF SCIENCE

THE sixteenth annual meeting of the North Carolina Academy of Science was held at the University of North Carolina on Friday and Saturday, April 27 and 28, 1917. At 2:30 P.M. the executive

committee met, passed on the report of the secretary-treasurer, elected 10 new members, and selected the State Normal College, Greensboro, as the next place of meeting. At 3 P.M. the reading of papers was begun and continued until 5:30, when adjournment was had. Reconvening at 8 P.M., the academy was welcomed to the university by Dean Andrew H. Patterson, after which President F. P. Venable, of the academy, delivered his presidential address, "The structure of the atom." Next Professor Collier Cobb gave a lecture on "Typical early maps of North Carolina" illustrated by lantern slides of some of the maps in question. The academy then adjourned to the hospitable home of Professor W. C. Coker for a highly enjoyable smoker.

The annual business meeting of the academy was held at 9:15 Saturday morning. Reports of the secretary-treasurer, the executive and other committees were made. On motion a committee was appointed to cooperate with a similar committee from the Science Section of the North Carolina State Teachers' Association in studying the subject of the teaching of high-school sciences in the state with reference to its increased efficiency. The secretary reported on his visit to the meeting of the Southern Association of Colleges and Secondary Schools and his appearance in behalf of the work in science before its committee on the curriculum of secondary schools. On motion, the secretary was again appointed as the representative of the academy at the next meeting of this association. After some discussion it was declared the sense of the meeting that an increased effort be made in 1918 to bring into the membership of the academy as many as possible of the high-school teachers of science in the state.

The following officers were elected for 1917–18:

President—W. A. Withers, State Agricultural and Engineering College, West Raleigh.

Vice-president—J. H. Pratt, University of North Carolina, Chapel Hill.

Secretary-treasurer—E. W. Gudger, State Normal College, Greensboro.

Additional members executive committee—Bert Cunningham, High School, Durham; H. R. Totten, University of North Carolina, Chapel Hill; H. C. Beardslee, Asheville School, Asheville.

At 10:50 a joint meeting was held of the academy and the North Carolina Section of the American Chemical Society for the reading of the papers of common interest to both bodies. Following this, papers were read before the academy until the program was finished at 1:40, when the members were entertained by the university at luncheon in Swain Hall. Of the 20 papers on the program not one was read by title. Counting the 10 new members, the total membership of the academy is 84, of whom 37 were present at this meeting. Including the presidential address, which will be published in the current number of the *Journal of the Elisha Mitchell Scientific Society*, the following papers were read:

Pliocene deposits in Orange county: John E. Smith.

These occur on the divides and on the higher terraces in the plateau section of the county and generally over the Triassic area except on the floodplains and on the steeper slopes near the streams.

On the upland (elevation, 500–600 feet) this material consists of smooth, rounded pebbles and cobbles (some of which are polished) of quartz and quartzose minerals up to six inches or more in diameter, together with fragments of the same and of other minerals down to the size of soil particles. In the Triassic area (elevation, 250–400 feet) the deposit comprises gravel, sand and soil (in addition to the above) in some places reaching a thickness of a foot or more. This material has been transported from a distance and characterizes the Granville soils, distinguishing them from those of the Penn series, which are derived from the Triassic rocks in place.

The thinly distributed pebbles on the higher divides of the county may be remnants of river deposits on a peneplain, but the soils, etc., of the lower interstream areas are doubtless of Lafayette age. (Illustrated with lantern slides.)

The pollination of Rotundifolia grapes: L. R. Detjen.

A close examination of the flowers of *Vitis rotundifolia* brings out the fact that this species of grape is not at all adapted to cross-pollination by means of the wind; on the contrary, it seems to indicate that insects alone are responsible for the transportation of the pollen. Bees of the family Andrenidæ and beetles of the species *Chauliognathus marginatus* were tested for their propensities of transporting pollen and for the searching for flowers of the fruit-bearing varieties.

The test was made by enclosing insects, newly captured on flowers of staminate vines, separately in spacious cloth bags together with clusters of open but unpollinated flowers. The results secured substantiate the hypothesis of insect pollination. They further indicate that bees of the fam-

ily Andrenidæ are probably the most effective pollinators of the vine and that beetles are of only minor importance. Bees of the family Megachilidæ are also active workers and undoubtedly contribute considerably toward the production of fruit.

Saprolegnia anisospora in America: W. C. COKER.

This species has not before been reported in America. We have found it twice in Chapel Hill, in marshy shaded places containing algæ. It is distinguished chiefly by the following characters:

1. The presence of spores of two or three sizes, borne usually in separate sporangia without regard to the size of the latter; the small spores from 10.5–11 μ in diameter, the large ones from 13.7–14.8 μ in diameter. In nearly all cultures there are formed a few very large spores, at least twice the size of the ordinary large ones, these appearing mixed in with the latter.

2. The irregular shape of the sporangia, which are not evenly cylindrical, but more or less waved, bent and constricted, and which proliferate either laterally from below as in *Achlya,* or within the old ones, as is usual in *Saprolegnia.*

3. In sexual reproduction numerous oogonia are formed, each with one or more antheridia of diclinous origin.

The jaws of the great barracuda, Sphyræna barracuda: E. W. GUDGER.

A careful description, illustrated by photographs and a specimen, was given of the teeth and jaws of this fish. Their use was briefly described and some accounts of the ferocity of the fish narrated. In the waters of southern Florida it is generally more feared than the shark, being bold and inquisitive where the shark is cowardly. The data presented are part of a paper now in press in a volume of memoirs from the Tortugas Laboratory of the Carnegie Institution at Washington.

The status of the science work in the high schools of North Carolina (lantern): S. J. MARION.

This survey and report will be published in full in the forthcoming issue of the *North Carolina High School Bulletin.*

Armillaria mellea, Clitocybe cespitosa, Pleurotus sapidus and Claudopus nidulans in pure culture: H. R. TOTTEN.

The fact that the spores of *Armillaria mellea* and *Clitocybe cespitosa* (*C. monodelpha*) have two walls, while the spores of *Pleurotus sapidus* and *Claudopus nidulans* have only one wall is plainly shown in the sprouting spores. Mycelia of the four mushrooms were shown in pure culture on several media, also drawings of the mycelial threads as seen under high power. *Armillaria mellea* forms a slow-growing, closely flocculent, cream-colored mat, and soon produces long, brown to black, root-like rhizomorphs. In agar these rhizomorphs are beautifully shown radiating from the mat-like central mass. The mycelium of *Clitocybe cespitosa* is much like that of *Armillaria mellea,* but the threads are not so closely woven and the rhizomorphs, or root-like bodies, are white. It is shown that *Armillaria mellea* and *Clitocybe cespitosa,* while very closely related, are not the same. The mycelium of *Claudopus nidulans* is silkier and is from white to pink in color. The mycelium of *Pleurotus sapidus* except in old cultures is loose and silky and is very fast growing, soon covering the medium with a mass of pure white threads. Fruiting bodies of both *Pleurotus sapidus* and *Claudopus nidulans* were shown developing in pure cultures.

Structural geology of Orange county, N. C.: JOHN E. SMITH.

With few exceptions the rocks of this county occur in long, narrow belts and "islands" extending north 65° east. Named in their order from the southeast these areas comprise the Triassic sedimentaries, granite, diorite, rhyolite, schists and greenstone, diorite, schists and phyllite, greenstone and schists, diorite, schists and greenstone, diorite, granite.

The structure of these rocks is that of a syncline whose trough centers along the line of strike and passes near Cheek's Siding about three miles east of Mebane. Measured along the dip this syncline is approximately twenty miles wide and probably contains folds of minor importance within it. The major joints, flow lines, etc., of the igneous rocks in many places parallel both the dip and the strike of the schists belts. Inclusions of the diorite in the granite attest the greater age of the former and the presence of belts of igneous rocks beneath the margins of the syncline certify their contribution to the structure and prove the greater age of the schists, etc. South of Chapel Hill beyond Morgan Creek the strike is due east and west and the conglomerates, slates and rhyolites dip to the south at an angle of 65°. (Illustrated with maps, charts and structure sections.)

State regulation of the sale and manufacture of gas: C. W. EDWARDS.

In 1910, out of 228 cities in the United States of more than 25,000 population, only 47 had no requirements such as are in a bill proposed for North Carolina. Of these 228 cities, 103 are

under state laws and have no additional municipal regulations. A number of cities such as Baltimore, Buffalo, Los Angeles and Milwaukee have local provisions in addition to state laws. In 1910, sixteen states had laws providing for the state inspection of meters and of the purity of gas—Connecticut, Georgia, Kansas, Maryland, Massachusetts, Nevada, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Vermont, Virginia, Washington, Wisconsin and California (B. of S. Circular No. 32). Doubtless the list is now larger.

In 1910 the net income to the state of Massachusetts in meter-testing alone was over $5,000. The total cost of the tests on quality, purity, pressure, etc., was assessed on the operating companies according to their sales. Meter-testing is on the fee basis. There is no good reason why such a department in North Carolina would not yield a revenue to the state.

That the Corporation Commission in North Carolina should have the power and machinery at its command to protect the interests of citizens seems obvious for the following reasons: Under existing law it is the duty of the commission to regulate the rates to be charged by gas companies. The proper price is determined in a large measure by the quality of product sold and this is almost at the will of the producer. Gas in New York City furnishes 680 heat units per cubic foot and is sold at 80 cents. Gas in Durham furnishes at times less than 500 heat units and is sold at $1.50. In one city in this state gas furnishing 412 heat units sold for $1.60. The standard requirement in regulated states is around 600 heat units. The difference in quality means a loss of from five to twenty thousand dollars per year to consumers in various towns of this state and the loss would easily run into hundreds of thousands to the state at large. While it may be to the interest of certain communities to sell a cheap, poor gas it is safe to say that it is always against public interest to have a cheap, poor gas sold at a rich, high price. To fairly meet its responsibility the commission must know from its own tests the quality of the product sold. The consumer is entirely helpless.

Aside from the question of rates, the public is vitally interested from the standpoint of health. In the method of manufacture used by one company in this state, carbon monoxide and hydrogen are produced in equal quantities. Both of these gases are odorless and one is a deadly poison. Combined they give a cheap gas furnishing about 300 heat units. This gas causes a meter to register just as fast as a 600 heat unit gas. It is the duty of this company to carburet this gas with an oil which not only brings its heat value to standard, but gives it a very pungent odor that makes it noticeable in case of a leak. In this town a series of fatal accidents have occurred due solely to the neglect of the service company. In other methods other deleterious elements are introduced by carelessness so that in all cases public interest demands systematic testing under the authority of the state.

It is just as reasonable to let manufacturers sell anything called fertilizer without tests as to composition as it is to permit of the sale of untested gas. Our duty to test meters is just as obvious as our duty to test weights and measures.

The advantages resulting from such an act would not even be principally with the citizen. An expert employed by the state to travel from plant to plant observing and testing, corrects irregularities and errors in manufacture that may mean thousands of dollars saved to the companies. If ammonia appears in the gas it means that a valuable by-product is being lost. So it is with other errors of manufacture. The fact that meters are tested by the state brings a feeling of confidence to the consumer that is worth much to the gas companies. Uniform, improved and economical manufacture brings new and profitable business and this more than compensates for any costs involved.

No abstracts have been received for the following papers:

The relative toxicity of uranium nitrate in animals of different ages, by Wm. DeB. MacNider.

Trembles, by Frederick A. Wolf.

Permanency in fleshy fungi, by H. C. Beardslee.

Sound-wave photography (lantern), by Andrew H. Patterson.

Evolution in sponges and changes in classification, by H. V. Wilson.

The revision of the atomic weight of zirconium, by F. P. Venable and J. M. Bell.

Recent investigations about cottonseed meal, by W. A. Withers and F. E. Carruth.

The physics of the shrapnel shell, by Andrew H. Patterson.

Portolan charts (lantern), by Collier Cobb.

The idea of force in mechanics, by Andrew H. Patterson.

The times we think in, by George W. Lay.

The life history of the pecan trunk borer, by R. W. Leiby.

E. W. Gudger,
Secretary